A critical requirement of the writing nib in the instant invention is that the pressure exerted by the nib on the writing substrate must not significantly exceed the yield point of the substrate. Significantly larger pressures will result in writing substrate deformation.

Nib pressure on a writing substrate is primarily the result of two factors. The first factor is the relative position of the pen to the writing substrate Generally once the writing nib is in contact with the substrate, moving the pen body closer to the substrate will result in increased nib force and pressure. The second factor affecting nib pressure is nib flexibility. With extremely rigid nibs, even small changes in the relative position of the pen and the subtrate, will result in significant changes in nib tip force and pressure. When highly flexible nibs are employed, large changes in relative pen location will have minimal effect on nib pressure on the substrate.

In order to quantify forces acting on substrate and nib flexibility, a "displacement versus force" test was devised. This test yielded information on how much a writing nib will bend (or be displaced) when a given force is applied. This figure of flexibility when considered with information on contact area of the nib on the writing surface, provides a writing pressure which can be compared to the substrate yield point to determine the efficacy of the nib. Each nib tested was placed in a pen barrel (or body) as it would be used during writing. The barrel was rigidly attached to a vertical positioner which could be precisely raised and

lowered. The barrel and nib was attached in a manner to place the nib at a 45° angle to the writing surface to allow the nib to bend, rather than compress and to simulate normal use. An electronic balance was situated under the writing nib. A grided writing substrate was placed on the balance such that when the pen barrel and nib were lowered, the nib would contact the writing substrate and exert a force on the balance. For each nib tested, three parameters were recorded: vertical position of the pen barrel relative to the substrate; force exerted by the nib on the substrate; and area of contact at each pressure.

Table I contains the results of tests on nibs found in three commercially available pens, identified as pens A, B and C, as well as three custom manufactured PVA nibs. It should be noted the PVA nibs, when wet, are extremely flexible and exert very little force on the substrate (or test apparatus) even when displaced a significant percentage of their length. The three commercially available nibs exerted significantly higher force for equivalent displacement. A difference of approximately two to three orders of magnitude of nib pressure was noted between the commercially available nibs and the PVA nibs. As such, accompanying Graphs I (FIG. 4) and II (FIG. 5) use different force scales to represent the data and Graph III (FIG. 6) is logarithmic to allow all 6 sets of data to be contained on the same graph.

TABLE I - DISPLACEMENT VERSUS FORCE OF SELECTED NIBS						
Nib Displacement	Nib Force (grams)					
(mm)	Pen A	Pen B	Pen C	PVA nib 1	PVA nib 2	PVA nib 3
0.00	0	0	0	0.00	0.00	0.00
0.25	20	110	4	0.05	0.09	0.17
0.51	42	239	10	0.12	0.23	0.29
0.76	81	391	18	0.12	0.30	0.35
1.02	139	430	27	0.15	0.35	0.40
1.27	222	520	37	0.17	0.39	0.45
1.52	342	813	46	0.18	0.40	0.48
1.78	447	1033	58	0.18	0.40	0.52
2.03	554	-	70	0.19	0.45	0.53
2.29	661	-	80	0.20	0.50	0.57
2.54	769	-	93	0.21	0.54	0.61
2.79	874	-	106	0.21	0.58	0.67
3.05	930	-	118	0.22	0.63	0.82
3.30	-	-	130	0.27	0.75	0.98
3.56	-	-	144	0.32	0.90	1.20
3.81	-	-	155	0.38	1.10	1.60
4.06	-	-	164	0.47	1.35	1.91
4.32	-	-	179	0.59	1.78	2.54
4.57	-	-	-	0.70	2.34	3.10
4.83	-	-	-	0.87	2.80	4.20
5.08	-	-	-	1.08	3.80	5.70

Graph I, and the accompanying data from Table I provide data on the three commercially available pen nibs. The three commerically available pen nibs and the three PVA custom nibs were of similar size and shape. Graph I depicts the forces exerted on the electronic balance corresponding to various vertical displacements of the pen body. This test simulates a user touching the pen to a writing substrate and the resulting force applied to that substrate. While the Pen C employed the most flexible nib, it should be noted that even this nib exerted over 100 grams of force for a 3 mm displacement.